

Appln No. 09/891,412  
Reply to the Office Action dated November 5, 2003

### **REMARKS**

Claims 1-31 and new Claim 32 remain active in the case. Claims 22-31 are allowed.  
Reconsideration is respectfully requested.

The present invention relates to a silica gel that has excellent heat resistance and hydrothermal resistance.

#### **Claim Amendment**

The claims generally have been amended in order to make minor improvements to the language of the claims. None of the amendments are believed to have introduced new matter into the case.

New Claim 32 is presented and is a combination of original Claims 1 and 2. Entry of the amendments and the new claim into the record is respectfully requested.

#### **Claim Rejection, 35 USC 112**

The rejection of Claims 1 and 7 over the issue that has been raised is believed to have been obviated by the amendment to the two claims which eliminates the term "resulting" and which states that the hydrolysis reaction thereby forms a hydrogel. Withdrawal of the rejection is respectfully requested.

#### **Invention**

The present invention provides a silica gel having a narrow pore distribution and excellent heat resistance and hydrothermal resistance. The silica gel is prepared by a method

of producing a silica gel by hydrolyzing a silicon alkoxide, thereby forming a hydrogel, and then subjecting the hydrogel to a hydrothermal treatment substantially without aging the hydrogel.

#### Prior Art Rejection

Claims 1-4 and 6 stand rejected based on 35 USC 102(b) as anticipated by Sakai et al, U. S. Patent 5,750,258. This ground of rejection is respectfully requested.

The Sakai et al is clearly of secondary interest because it is concerned with a method of producing cross-linked resin coated silica fine particles by surface treating calcined silica fine particles with a vinyl-containing silane coupling agent which introduces vinyl groups onto a surface of each silica fine particle, and then dispersing and polymerizing a mixture containing a monofunctional vinyl monomer and a polyfunctional vinyl monomer thereby resulting in surface treated silica fine particles. Such disclosure is irrelevant to the present invention.

The patent at column 4, lines 45-48 discloses that green silica fine particles are prepared by hydrolyzing and polycondensing silicon alkoxide by the sol-gel method. While a hydrolysis reaction occurs, the hydrolysis step is not followed by a hydrothermal treatment under the condition that does not result in substantial aging of the product. All that is said is that hydrolysis of silicon alkoxide result in green silica particles. This not the present process.

Example 1 of the patent contains no disclosure of relevance to the present claims, because it is concerned only with an embodiment of the process of the patent of providing calcined silica fine particles with a coating of silane material by the reaction of a combination of methacryloxypropyltrimethoxysilane, vinyl-containing silane and tetraethoxysilane. There is no teaching or suggestion of a hydrothermal treatment of silica hydrogel in Example 1 of the

patent. There is certainly no teaching or suggestion of a process of preparing a silica gel by preparing a hydrogel under conditions by which the hydrogel has a breaking stress no more than 6 Mpa.

Claims 1, 3, 4 and 6 stand rejected based on 35 USC 102(b) as anticipated by Misuda et al, U. S. Patent 5,307,821. This ground of rejection is respectfully requested.

The Misuda et al patent is also believed to be irrelevant to the present invention because it discloses a method of providing tobacco leaves or tobacco raw material with a surface coating of silica gel. As such, this objective is achieved by coating of the tobacco material with a colloidal solution of silica sol and then forming a silica gel by drying the coated material. In the process, a silicon alkoxide is subjected to hydrolysis on the surface of the tobacco raw material thereby preparing a silica. While the reference at least discloses the hydrolysis of a silicon alkoxide in an aqueous environment, there is absolutely no teaching or suggestion of a process of forming a silica, whereby, in a first step, a silicon alkoxide is hydrolyzed preferably with an ammonia containing solution on the leaves of tobacco. As described at column 5, lines 30-39 of the patent, the hydrolysis is conducted at an elevated temperature of 60° to 70° C for a number of hours to form a particulate silica. This completes the process of the reference. Clearly, there is no teaching or suggestion of a process in which an aqueous solution of a silicon alkoxide, apart from tobacco material, is subjected to hydrolysis to the extent that a hydrogel is formed of a limited strength, which step is then immediately followed by a hydrothermal treatment that does not result in significant aging of the hydrogel.

The Examiner points to column 5, lines 35-39 of the patent as significant. However, the reference discloses nothing of a hydrothermal treatment of a hydrogel. Moreover the time and

temperature ranges that have been referred to pertain to the hydrolysis conditions of a silicon alkoxide to form a hydrogel, which is not the subject matter of present Claim 3. Accordingly, the patent does not anticipate the invention as claimed in the indicated claims and withdrawal of the rejection is respectfully requested.

Claims 7-10 and 20 stand rejected based on 35 USC 102(b) or 35 USC 103(a) as anticipated by or rendered obvious over Sakai et al, U. S. Patent 5,750,258. This ground of rejection is respectfully requested.

As indicated above, the only disclosure in the Sakai et al patent is the hydrolysis of a silicon alkoxide in an aqueous medium to produce a fine, particulate silica by the sol-gel method. However, even in providing the very brief disclosure of silicon alkoxide hydrolysis, there is nothing to suggest the reference conducts the hydrolysis under controlled conditions to produce a hydrogel that has a low breaking stress as is clear from Claim 2, and certainly does not teach or suggest a subsequent or follow-on step of hydrothermally treating the hydrogel without substantially aging the hydrogel.

As to the matter of present Claim 8 and the breaking stress of 6 Mpa, it is clear that the cited portion of the patent is irrelevant to Claim 8 because the cited strength of about 50 kgf/mm<sup>2</sup> pertains to the breaking strength of **crosslinked resin coated fine particles** and not to a hydrogel having a particular breaking stress **prior** to its hydrothermal treatment! Accordingly, there is no correlation between the limitation of present Claim 8 and the indicated portion of the patent. Thus, the reference neither obviates nor anticipates the claimed silica gel that is produced by the particular process of producing it as set forth in Claim 7. Withdrawal of the stated grounds of rejection is respectfully requested.

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Claims 7, 9, 10 and 20 stand rejected based on 35 USC 102(b) or 35 USC 103(a) as anticipated by or rendered obvious over Misuda et al, U. S. Patent 5,307,821. This ground of rejection is respectfully requested.

Applicants retain their position as stated above regarding Misuda et al, because the reference only discloses the provision of tobacco leaves with a coating of fine silica particles. To do this tobacco leaves are brought into contact with two solutions by which a silicon alkoxide is hydrolyzed at elevated temperature and for hours of reaction in order to provide the tobacco leaves with a coating of silica gel. Clearly, there is no teaching or suggestion of hydrolyzing silicon alkoxide in aqueous medium to form a hydrogel which then is subjected to a hydrothermal treatment under condition which do not permit substantial or significant aging of the hydrogel. There is simply no teaching or suggestion of such a two stage process in the patent. Accordingly, the patent neither anticipates nor suggests the invention as claimed and withdrawal of the rejection is respectfully requested.

The Examiner is thanked for the indication of allowable subject matter in the case.

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It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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